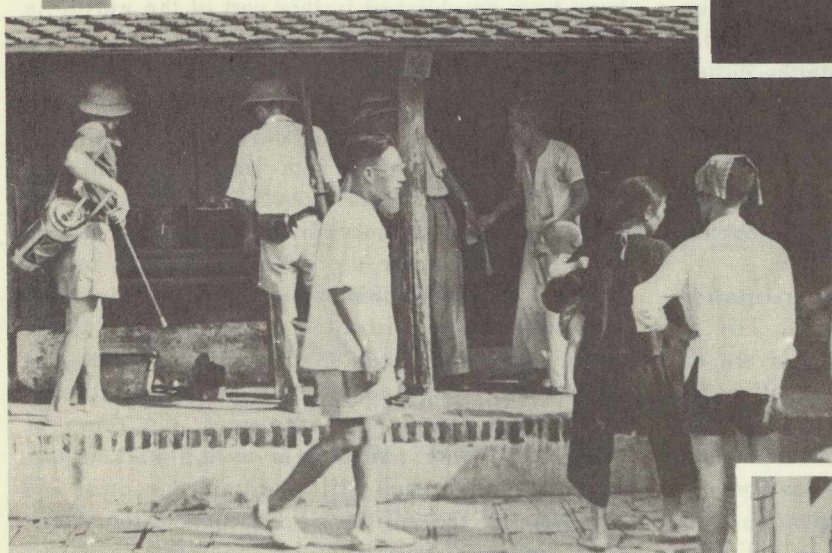


Mixing water-wettable DDT. The suspension required straining through fine mesh cloth to prevent clogging of sprayer nozzles.

Spray crew foremen receiving directions through an interpreter.



Spray man, accompanied by armed guard, preparing to spray the porch of a house. Note the man at right wearing a cloth on his head to shade his eyes because of trachoma infection.

Distributing Aralen tablets in Ha Dong for malaria prophylaxis. Woman on the left is taking tablets with native tea.



pophilic mosquito, *Anopheles minimus minimus*, is the chief vector. According to French malariologists, malaria is not as serious a problem in the lower delta sections where *minimus* is ecologically replaced by the zoophilous species, *Anopheles hycranus sinensis*, considered a much less efficient vector than *minimus*. *Sinensis* is seldom found resting inside of houses during the daytime; it may more often be found resting in animal shelters. It does, however, frequently enter human habitations at night. Although a number of other *Anopheles* undoubtedly are concerned to some degree in the over-all epidemiology of malaria in Tonkin, their roles are not so clearly understood. Of greatest concern at present is the fact that in the Red River Delta within recent years the possibility of serious malaria epidemics has been created by the increased numbers of refugees from the foothills who have been arriving daily in the delta area. It is reported that these refugees are infected up to 100 percent with *falciparum* and/or *vivax* malaria. This movement of population is in part a result of the devastation to villages under the scorched earth policy which has been followed by the Viet-Minh during their retreat to the foothills under pressure of the French military forces.

OBJECTIVES

The primary objectives of the malaria control program in North Viet-Nam were (1) the establishment of an operational DDT residual spray program directed against the malaria mosquito vectors; (2) the development of an Aralen (chloroquine) distribution program to eliminate human gametocyte carriers; thus, theoretically, two links in the chain of the malaria transmission cycle would be severed and on the basis of statistical chance of transmission, the most rapid reduction possible would be achieved in the incidence of malaria; and (3) at the same time, long-range planning called for the establishment of a coordinated malaria control organization within the regional and provincial governments which would serve as a permanent nucleus for gradual expansion into areas brought within the security sphere at some future time.

METHODS OF OBTAINING OBJECTIVES

The first step taken toward establishing a functioning organization in North Viet-Nam was the training of spray crews, which was started within a week after our arrival in Hanoi. The first American aid program for Indo-China was formally

initiated with all due ceremony in the village of Phung Khoang on August 18, 1950. The training work was done in Hanoi primarily on a practical demonstration basis. For purposes of an expanding program, each spray crew was made up of one foreman, one subforeman, and four spray men, and in addition, a truck driver, who did not participate in the actual spray operations. It was anticipated that eventually only one foreman would be required per crew and that the number of spray men would eventually be reduced to three. Approximately 1 week was required for spray-crew training, with two crews being trained at the same time. During the season a total of only four crews was trained owing to the lack of spray and automotive equipment and to prevailing insecurity conditions. Twenty or more armed guards were required to accompany the spray crews during spray operations for security reasons.

The initial spray crew set-up was found very useful on an expanding program where the inexperienced foreman and subforeman each had to handle only two rather than three or four spray men during the training period when all were new to spray procedures. Moreover, when an additional new crew was to be established, the new foremen were trained first, then an older, experienced foreman was transferred from an already trained crew to take charge of the new crew and the new foreman was used as his subforeman. The experienced subforeman of the experienced crew was moved up to the position of foreman of the experienced crew and took on a new, inexperienced foreman as his subforeman. Thus, each new crew had at least one experienced man in the capacity of foreman at all times.

The training of foremen and spray crews involved discussion through an interpreter of the basic biology of mosquitoes and mode of malaria transmission, together with the principles of control, using modern residual insecticides. It was gratifying to see how quickly this information was acquired and apparently understood by the spray crew personnel, who were very cooperative and anxious to learn. Later, each man was given instructions in the details of operating the sprayer. Practice in spray technique was done first with water. Then, mixing of a 5 percent DDT water-wettable powder suspension was carried out, and practice was given by the actual spraying of government housing quarters and refugee camps in Hanoi before proceeding to the treatment of villages near Hanoi.

During the training period each spray man was given the necessary wrenches, screwdriver, and pliers and taught to service his sprayer. The various technique and sprayer problems were worked out. In order to prevent stoppage of the spray nozzle, the nozzle screen was removed and all DDT suspensions were strained through fine-mesh cloth before being poured into the Hudson 2½-gal. sprayer, which is not considered to be too well designed for use with water-wettable powders. It was also found best to remove as much paint as possible from the pump head and rim of the sprayer to prevent flaking off of the paint and consequent stoppage of the nozzle. A toothbrush was found useful for cleaning the nozzle opening.

Concurrently with spraying operations, a program for the distribution of Aralen was also established; however, most of this work, due to scarcity of personnel, was done by the spray crew foreman as time would allow, or was accomplished by arrangement with local police authorities. A special Aralen distribution team with a man to head and organize this phase of the work was planned so that antimalarial prophylaxis would be initiated before spraying of a village was done. Organized follow-up distribution at weekly intervals was planned but this was not carried out in all instances due to lack of personnel. At the end of the spraying season, October 15, some of the spray foremen were transferred to do Aralen distribution work, primarily on a treatment basis, especially for refugees around Hanoi. The work of distributing 10 percent DDT powder for louse control in refugee camps around Hanoi and in each of the sprayed villages was initiated along with Aralen distribution.

Late in September personnel were obtained to form a malaria blood slide survey team. The objective of this survey work was to determine prevalence of malaria in returning refugees in Hanoi, who were reportedly 100 percent infected, and also to compare sprayed and unsprayed villages, and those treated with Aralen, by taking random samples of the population. Plans were made to continue and expand this work beyond October 15 by using a part of the hospital-trained spray crew foremen. Arrangements were made to ship the slides to the United States for reading, due to the present lack of facilities for large-scale work in North Viet-Nam.

ORGANIZATION

The functional aspects of the North Viet-Nam malaria control organization were visualized as

consisting of: (1) medical epidemiology; (2) entomological survey and evaluation; (3) anopheline mosquito control; and (4) training and education.

In order to carry out effectively the program for malaria control on a long-range as well as on an impact basis, consideration was given to the establishment within the Regional Health Department at Hanoi of an over-all malaria control office which would determine policy, administer, coordinate, train, and assist in the guidance and direction of the several malaria control suboffices as might be established in the provincial capitals where security conditions would allow for operations. Under this plan each of the provincial suboffices would be expected, under guidance from the regional office, to set up its own requirements as to personnel, patterned after the regional organization. Selected key personnel would be trained at the regional level and would later conduct further training courses at each suboffice headquarters. Each suboffice would be consigned equipment and supplies from the regional headquarters to satisfy its needs in the province.

It was emphasized that actual spray operations must of necessity be decentralized into the provinces. This required that provincial malaria control organizations be established within each provincial capital, including offices and a shop-warehouse for maintenance of equipment and storage of supplies under safe conditions of control. It was recommended that all operational personnel live within the province in which they were to work.

During the winter months three of four key personnel would be allowed to come to Hanoi from each province for a 2- to 4-week training period in malaria control practice and in principles of administration and operations. The different provinces would be staggered so that personnel from only about three provinces would be in training at one time. These key personnel would then return to their respective provinces to secure and train operational personnel obtained within the province and to set up seasonal spraying plans and schedules.

Because of security conditions an alternate scheme was considered. Instead of having permanent spray crews working out of the provincial capital, it was thought that a training group might be established in the provincial capital. Each village would select one man who could be trained in the provincial capital and who could then return to his village with sprayers and DDT. There, he would train other men to assist him with spraying;

and when the spraying was completed, the equipment would be returned to the provincial capital for subsequent use in other villages.

SUMMARY OF ACCOMPLISHMENTS

The following towns and villages were treated with 5 percent water-wettable DDT residual spray between August 18 and October 1: Hanoi, Ha Dong, Phung-Khoang, Van Phuc, Thach-Bich, Hai-Duong (hospital), Van Quan, Ha-Tri, and Phuong-Tri.

Up to October 1, a total of approximately 4,000 lb. of DDT was used to spray 2,500 houses. Thus, based upon the average application rate per house, which in the United States is approximately 1 lb., a relatively large amount of DDT was used per unit sprayed since a typical village housing unit consisted of a walled compound containing the family living quarters and often working quarters, as well as housing for domestic animals.

A total of 28,000 Aralen tablets was distributed to refugee camps in Hanoi, and in the chief town of Ha Dong and the villages of Khuong Thuong, Dong Xa, Dong Quang, and Ho Khau. In addition, the hospitals at Hai-Duong and Haiphong were supplied with 20,000 tablets for treatment of clinical malaria cases.

Approximately 20 kg. of louse powder, 10 percent DDT, were distributed to refugee camps in Hanoi. Plans were made to distribute the louse powder to villages sprayed.

In October a total of 460 blood slides was taken from the villages of Quynh Loi, Khuong Thuong, Dong Xa, and the Don Quan refugee camp; these slides were shipped to the United States for reading. Only 410 slides were readable and averaged 11.5 percent positive for malaria with approximately twice as many *falciparum* as *vivax* infections.

Progress Report on Proposed CDC Building

FRANK R. SHAW, Sanitary Engineer Director*

Since 1947, the Communicable Disease Center has sought the construction of a building to house all of its activities other than field stations. At this time the Communicable Disease Center is housed in 45 buildings located in Atlanta and Savannah, Ga., and Montgomery, Ala. In the metropolitan area of Atlanta 16 buildings are occupied, and much of this space is rented from private interests through Public Buildings Service.

On July 26, 1948, Mr. Oscar Ewing, Administrator, Federal Security Agency, accepted the gift of the Board of Directors, Emory University, of a 15-acre site facing Clifton Road just north of the Emory University campus.

A formal request by the Public Health Service for the appropriation of \$10,000,000 resulted in Public Building Services contracting for the planning of the building, with the cost not to exceed \$10,000,000. The planning of Federal buildings is a function of the Public Buildings Service of the General Services Administration. In most cases the PBS develops the plans in

Washington, but in this case it was decided that it would be expedient to have the plans developed under contract, by a local architect. In the spring of 1950 a contract was awarded Robert and Company Associates of Atlanta, and on June 5, 1950, the firm was presented a building program which outlined the needs of the Communicable Disease Center with respect to space and services. The constantly changing situation with regard to building costs caused the Public Buildings Service to authorize the contract architect to base planning on May 1950 prices.

Preliminary planning soon revealed that the original program could not be carried out within the price limitation of \$10,000,000. Consideration of this situation resulted in the decision to leave Technical Development Services at Savannah, Ga., and to exclude the warehouse and shops from the program.

At present the planning has progressed to the point where tentative plans for the several buildings have been approved by the CDC Building Committee, consisting of the Chiefs of the various Services, and by Public Buildings Service; and the architect is proceeding with the development

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